

Claims

What is claimed is:

- 5 1. A chemically amplified resist composition, said composition comprising:
- a) an imaging polymer,
 - b) acid-labile moieties,
 - c) a radiation-sensitive acid generator, and
 - d) a base additive component, wherein said base additive component
- 10 comprises:
- (i) a room temperature solid base, and
 - (ii) a liquid low vapor pressure base.
- 15 2. The composition of claim 1 wherein said low vapor pressure base has a vapor pressure of about 2 mm at room temperature.
3. The composition of claim 1 wherein said low vapor pressure base has a vapor pressure of about 1 mm at room temperature.
- 20 4. The composition of claim 1 wherein said solid base is selected from the group consisting of aromatic amines and imidazoles.
5. The composition of claim 1 wherein said low vapor pressure base is selected from the group consisting of triethanolamine, 1-naphthylamine, 2-naphthylamine, diphenylamine, acetanilide, 3,6,9-triazaundecamethylenediamine, 4,4'-propane-
- 25 1,3-diylbismorpholine, and 1,8-azabicycloundecene.
6. The composition of claim 1 wherein said acid-labile moieties are pendant from said imaging polymer.

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7. The composition of claim 1 wherein said acid-labile moieties are selected from the group consisting of acetal moieties and ketal moieties.
8. A method of forming a patterned material structure on a substrate, said method comprising:
- (A) providing a substrate with a layer of said material,
 - (B) applying a resist composition to said substrate to form a resist layer on said substrate, said resist composition comprising
 - a) an imaging polymer,
 - b) acid-labile moieties,
 - c) a radiation-sensitive acid generator, and
 - d) a base additive component, wherein said base additive component comprises:
 - (i) a room temperature solid base, and
 - (ii) a liquid low vapor pressure base,
 - (C) patternwise exposing said substrate to radiation whereby acid is generated by radiation-sensitive acid generator in exposed regions of said resist layer,
 - (D) developing a patterned resist structure in said resist layer by removing radiation-exposed portions of said resist, and
 - (E) transferring resist structure pattern to said material layer by removing portions of said material layer through spaces in said resist structure pattern.
9. The method of claim 8 wherein said material is selected from the group consisting of organic dielectrics, metals, ceramics, and semiconductors.
10. The method of claim 8 wherein said acid-labile protecting group is a moiety selected from the group consisting of ketals, acetals and orthoesters.

11. The method of claim 8 wherein said transfer of step (F) comprises reactive ion etching.
- 5 12. The method of claim 8 wherein at least one intermediate layer is provided between said material layer and said resist layer, and step (E) comprises etching through said intermediate layer.
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11. The method of claim 8 wherein said resist is thermally treated between steps (C) and (D).
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12. The method of claim 8 wherein said radiation used in step (C) has a wavelength selected from the group consisting of 248 nm, 193 nm, 157 nm, 13.4 nm, 1.4 nm, and 1.1 nm.
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13. The method of claim 8 where said radiation used in step (C) is selected from the group consisting of with electron beam and ion beam.
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20 14. The method of claim 8 wherein said material layer is comprises a chromium-containing composition, SiON or TiN.
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15. The method of claim 14 wherein said material layer is comprises a chromium-containing composition.
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16. A method of forming a material structure on a substrate, the method comprising:
- (A) providing a substrate,
 - (B) applying a resist composition to the substrate to form a resist layer on the substrate, said resist composition comprising

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- a) an imaging polymer,
 - b) acid-labile moieties,
 - c) a radiation-sensitive acid generator, and
 - d) a base additive component, wherein said base additive component comprises:
 - (i) a room temperature solid base, and
 - (ii) a liquid low vapor pressure base,
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- (C) patternwise exposing the substrate to radiation whereby acid is generated by radiation-sensitive acid generator in exposed regions of the resist layer,
 - (D) developing a patterned resist structure in the resist layer by removing radiation-exposed portions of the resist, and
 - (E) transferring resist structure pattern to the material by depositing the material onto the substrate or implanting material into the substrate
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- at spaces in the resist structure pattern.

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17. The method of claim 16 wherein said deposition of step (E) is done by electroplating, chemical vapor deposition or physical vapor deposition.